

IN THE CLAIMS

This listing of claims replaces all prior versions and listing of claims in the application.

Listing of Claims:

- I. (Currently Amended) Method for performing event detection and object tracking in image streams, wherein an event is defined as the occurrence of a type of activity which requires some type of action in response thereto, ~~such as the attention of an operator~~, said method comprising:
 - a) installing in field, a set of image acquisition devices, each of which comprising a local programmable processor for converting the acquired image stream, consisting of one or more images, to a digital format, and a local encoder, for generating, from said image stream, features, being parameters related to attributes of ~~objects~~areas in said image stream, and for transmitting a feature stream containing said features;
 - b) connecting each image acquisition device to a data network through a corresponding data communication channel;
 - c) connecting an image processing server to said data network;
 - d) prior to detecting said event, transmitting said feature stream from said image acquisition devices to said image processing server whenever at least one of a number and type of said features exceed a predetermined threshold;
 - e) wherein said threshold is applied to said image acquisition device to control when said local encoder generates and transmits said feature stream, and said number and type of features exceeding said threshold are indicative of activity to be further analyzed by said image processing server in order to detect said event;

- ef) determining said threshold by said image processing server;
- fg) detecting said event from analyzing said feature stream by said image processing server and;
- h) transmitting, by said image processing server, indications regarding said event in said image streams to an operator.

2. (Previously Presented) Method according to claim 1, wherein the local encoder is a composite encoder, being the local encoder that further comprises circuitry for compressing the image stream, and further comprising:

- a) operating said composite encoder in a first mode, during which it generates and transmits said feature stream to said image processing server, and
- b) operating said composite encoder in a second mode responsive to detecting said events, during which it transmits to said image processing server, in addition to said feature stream, at least a portion of said image stream in a desired compression level, according to commands sent from said image processing server.

3. (Canceled)

4. (Original) Method according to claim 1, further comprising decoding one or more compressed image streams containing events by said server, and transmitting the decoded image streams to the display of an operator, for viewing.

5. (Previously Presented) Method according to claim 2, further comprising recording one or more compressed image streams obtained while said local encoder operates in said second mode.

6. (Original) Method according to claim 2, further comprising dynamically allocating additional image processing resources, in the server, to data communication channels that receive image streams.

7. (Previously Presented) Method according to claim 2, wherein one or more feature streams transmitted by said local encoder operating in the first mode, comprises only a portion of the image stream.

8. (Original) Method according to claim 6, further comprising generating and displaying a graphical polygon that encompasses an object of interest, being within the frame of an image or an AOI in said image.

9. (Original) Method according to claim 8, further comprising generating and displaying a graphical trace indicating the history of movement of an object of interest, being within the frame of an image or an AOI in said image.

10. (Original) Method according to claim 1, wherein the image stream is selected from the group of images that comprises video streams, still images, computer generated images, and pre-recorded digital or analog video data.

11. (Original) Method according to claim 1, wherein the image streams are video streams, compressed using MPEG format.

12. (Original) Method according to claim 2, wherein during each mode, the encoder uses different resolution and frame rate.

13. (Previously Presented) Method according to claim 1, wherein the features are at least one of:

motion features;

color,

portion of the image;

edge data; and

frequency related information.

14. (Previously Presented) Method according to claim 1, further comprising performing, by the server, at least one of:

License Plate Recognition (LPR);

Facial Recognition (FR);

detection of traffic rules violations;

behavior recognition;

fire detection;

traffic flow detection; and

smoke detection,

using a feature stream, received from the local encoder of at least one image acquisition device, through its data communication channel.

15. (Currently Amended) System for performing event detection and object tracking in image streams, wherein an event is defined as the occurrence of a type of activity which requires some type of action in response thereto, ~~such as the attention of an operator~~, said system comprising:

- a) a set of image acquisition devices, installed in field, each of which comprises:
 - a. 1) a local programmable processor for converting the acquired image stream to a digital format;
 - a. 2) a local encoder, for generating, from said image stream, features, being parameters related to attributes of ~~objects~~areas in said image stream, and for transmitting a feature stream, whenever at least one of a number and type of said features exceed a predetermined threshold, wherein said threshold is applied to said image acquisition device to control when said encoder generates and transmits said feature stream, and said number and type of features exceeding said threshold are indicative of activity to be further analyzed in order to detect said event;
- b) a data network, to which each image acquisition device is connected through a corresponding data communication channel;
- c) a remote image processing server connected to said data network, said remote image processing server determining said threshold which is applied to said image acquisition device, and said remote image processor receiving said feature stream transmitted by said local encoder; and

- d) said remote image processing server detecting said event from analyzing said feature stream, and transmitting indications regarding said event to an operator.

16. (Previously Presented) System according to claim 15, wherein said local encoder is a composite encoder and further comprises circuitry for compressing said image stream, said composite encoder having a first operating mode, during which it generates and transmits said feature stream to said server, and having a second operating mode, during which it transmits to said server, in addition to said feature stream, at least a portion of said image stream in a desired compression level, according to commands sent from said server.

17. (Original) System according to claim 15, further comprising an operator display, for receiving one or more image streams that are decoded by the server and contain events.

18. (Previously Presented) System according to claim 16, further comprising a network video recorder for recording one or more image streams, obtained while an associated local encoder operates in said second mode.

19. (Original) System according to claim 15, in which the server is capable of dynamically allocating additional image processing resources to data communication channels that receive image streams.

20. (Original) System according to claim 16, in which one or more image streams obtained while operating in the first mode, comprises only a portion of the image that corresponds to a desired AOI.

21. (Original) System according to claim 15, in which the server further comprises processing means for generating and displaying a graphical polygon that encompasses an object of interest, being within the frame of an image or an AOI in said image.

22. (Original) System according to claim 21, in which the server further comprises processing means for generating and displaying a graphical trace indicating the history of movement of an object of interest, being within the frame of an image or an AOI in said image.

23. (Original) System according to claim 15, in which the image stream is selected from the group of images that comprises video streams, still images, computer generated images, and pre-recorded digital or analog video data.

24. (Original) System according to claim 15, in which the image streams are video streams, compressed using MPEG format.

25. (Original) System according to claim 16, in which during each mode, the encoder uses different resolution and frame rate.

26. (Previously Presented) System according to claim 15, in which the features are at least one of:

motion features;

color;

portion of the image;

edge data; and

frequency related information.

27. (Previously Presented) System according to claim 15, in which the server further comprises processing means for performing at least one of:

License Plate Recognition (LPR);

Facial Recognition (FR);

detection of traffic rules violations;

behavior recognition;

fire detection;

traffic flow detection;

smoke detection; and

using a feature stream, received from the local encoder of at least one image acquisition device, through its data communication channel.

28. (Canceled)

29. (Canceled)

30. (Previously Presented) Method according to claim 1 wherein said features further comprise motion features, and said motion features are encoded in said feature stream only when said motion features exceed said predetermined threshold.

31. (Currently Amended) ~~Method~~System according to claim 15 wherein said features further comprise motion features, and said motion features are encoded in said feature stream only when said motion features exceed said predetermined threshold.

32. (Currently Amended) A distributed image processing method for effectively performing event detection in a large number of concurrent image sequences, wherein an event is defined as the occurrence of a type of activity which requires some type of action in response thereto, ~~such as the attention of an operator~~, said method comprising:

- a) performing low level feature extraction in the vicinity of an image acquisition device, said low level feature extraction comprising:
 - i) receiving an image stream from each of a plurality of image acquisition devices installed in field;
 - ii) extracting features from said image stream from each of said plurality of image acquisition devices, said features being parameters related to attributes of ~~objects~~areas in said image stream;
 - iii) prior to detecting said event, generating a reduced bandwidth feature stream for each said image stream, said reduced bandwidth feature stream based upon said features;
- b) prior to detecting said event, transmitting said reduced bandwidth feature stream for each of said plurality of image acquisition devices to a remote image processing server; and
- c) detecting events by performing high level image processing at said remote image processing server, said high level image processing comprising:
 - i) receiving said reduced bandwidth feature stream transmitted from each of said plurality of image acquisition devices,
 - ii) analyzing each said reduced bandwidth feature stream at said remote image processing server, and
 - iii) detecting events in each said image stream based upon said analyzing of each said reduced bandwidth feature stream by said remote image processing server.

33. (Previously Presented) The method of claim 32 further comprising transmitting to said remote image processing server at least a portion of an image stream from any of said plurality of image acquisition devices associated with a reduced bandwidth feature stream in which said remote image processing server detects an event.

34. (Previously Presented) The method of claim 33 further comprising displaying said image stream in which an event is indicated on a display screen of an operator at said remote image processing server.

35. (Previously Presented) The method of claim 32 wherein said features are encoded in said reduced bandwidth feature stream only when at least one of a number and type of said features exceed a predetermined threshold, wherein said threshold is applied to said image acquisition device to control when said encoder generates and transmits said feature stream, and said number and type of features exceeding said threshold are indicative of activity to be further analyzed by said remote image processing server in order to detect said event.

36. (Previously Presented) The method of claim 35 wherein said transmitting said reduced bandwidth feature stream to said remote image processing server occurs only when said number and type of features exceed said predetermined threshold.

37. (Previously Presented) The method of claim 35 wherein said features further comprise motion features, and said motion features are encoded in said reduced bandwidth feature stream only when said motion features exceed said predetermined threshold.

38. (Previously Presented) The method of claim 35 wherein said predetermined threshold is set by said remote server.

39. (Previously Presented) The method of claim 32 further comprises recording said image stream when said event is detected therein .

40. (Previously Presented) The method of claim 33 wherein said reduced bandwidth feature stream comprises only a portion of said image stream.
41. (Previously Presented) The method of claim 38 further comprising generating and displaying a graphical polygon that encompasses an object of interest within the frame of an image or an AOI in said reduced bandwidth feature stream.
42. (Previously Presented) The method of claim 41 further comprising generating and displaying a graphical trace indicating the history of movement of said object of interest.
43. (Previously Presented) The method of claim 32 wherein said image stream is selected from the group of images comprising video streams, still images, computer generated images, pre-recorded digital video data and pre-recorded analog video data.
44. (Previously Presented) The method of claim 32 wherein said features comprise at least one of:
- motion features;
 - color,
 - a portion of the image;
 - edge data; and
 - frequency related information.
45. (Previously Presented) The method of claim 32 wherein said second processing step further comprises performing, by said remote image processing server, at least one of:

License Plate Recognition (LPR);

Facial Recognition (FR);

detection of traffic rules violations;

behavior recognition;

fire detection;

traffic flow detection; and

smoke detection;

using said reduced bandwidth feature stream received from at least one of said plurality of image acquisition devices.

46. (Currently Amended) A distributed image processing system for effectively performing event detection in a large number of concurrent image sequences, said distributed image processing system having an in field component and a remote component, wherein an event is defined as the occurrence of a type of activity which requires some type of action in response thereto, ~~such as the attention of an operator~~, said distributed image processing system comprising:

a) a low level feature extraction component located in field, said low level feature extraction component comprising:

a plurality of image acquisition devices installed in field, each producing an image stream;

a processor and an encoder associated with each of said plurality of image acquisition devices;

said processor converting said image stream to a digital format;

said encoder extracting features from said image stream and generating a reduced bandwidth feature stream therefrom, said features being parameters related to attributes of ~~objects~~arcs in said image stream;

b) a remote high level image processing component comprising a remote image processing server;

c) a data network with which said low level feature extraction component communicates with said remote image processing server, each of said plurality of image acquisition devices and associated encoders communicating with said data network through a corresponding data communication channel;

d) wherein said encoder transmits said reduced bandwidth feature stream to said remote image processing server prior to detection of said event;

e) wherein said remote image processing server analyzes said reduced bandwidth feature stream and thereby detects said events associated with said image stream from each of said plurality of image acquisition devices; and

f) wherein, responsive to detecting said events, said remote image processing server causes at least a portion of said image stream associated with said events to be transmitted to said remote image processing server.

47. (Previously Presented) The system of claim 46 wherein said encoder comprises a composite encoder which incorporates said processor, and further comprises circuitry for compressing said image stream, said composite encoder being having a first operating mode during which it transmits said reduced bandwidth feature stream to said remote image processing

server, and a second operating mode during which it transmits to said remote image processing server, in addition to said feature stream, at least a portion of said image stream in a desired compression level, according to commands sent from said remote image processing server, said remote image processing server controlling said composite encoder to operate in said second operating mode responsive to detecting said events.

48. (Canceled)

49. (Previously Presented) The system of claim 47 further comprising an operator display for receiving from said remote image processing server said image stream in which an event is detected.

50. (Previously Presented) The system of claim 46 wherein said features are encoded in said reduced bandwidth feature stream only when at least one of a number and type of said features exceed a predetermined threshold, wherein said threshold is applied to said image acquisition device to control when said encoder generates and transmits said feature stream, and said number and type of features exceeding said threshold are indicative of activity to be further analyzed by said remote image processing server in order to detect said event.

51. (Previously Presented) The method of claim 50 wherein said reduced bandwidth feature stream is transmitted to said remote image processing server only when said number and type of features exceed said predetermined threshold.

52. (Previously Presented) The system of claim 50 wherein said features further comprise motion features, and said motion features are encoded in said feature stream only when said motion features exceed said predetermined threshold.

53. (Previously Presented) The system of claim 50 wherein said predetermined threshold is established by said remote image processing server.

54. (Previously Presented) The system of claim 47 further comprising a network video recorder associated with each of said plurality of image acquisition devices for recording said image stream when said composite encoder operates in said second mode.

55. (Previously Presented) The system of claim 47 wherein said remote image processing server dynamically allocates additional image processing resources to data communication channels receiving said image stream.

56. (Previously Presented) The system of claim 47 wherein said feature stream comprises only a portion of said image stream.

57. (Previously Presented) The system of claim 49 wherein said remote image processing server further comprises a programmable processor for generating and displaying on said operator display a graphical polygon that encompasses an object of interest within the frame of an image or an AOI in said image.

58. (Previously Presented) The system of claim 57 wherein said remote image processing server generates and displays on said operator display a graphical trace indicating a history of movement of said object of interest.

59. (Previously Presented) The system of claim 46 wherein said image stream is selected from the group of images comprising video streams, still images, computer generated images, pre-recorded digital video data and pre-recorded analog video data.

60. (Previously Presented) The system of claim 46 wherein said features comprise at least one of:

motion features;

color,

a portion of the image;

edge data; and

frequency related information.

61. (Previously Presented) The system of claim 46 wherein said remote image processing server performs at least one of:

License Plate Recognition (LPR);

Facial Recognition (FR);

detection of traffic rules violations;

behavior recognition;

fire detection;

traffic flow detection; and

smoke detection;

using said reduced bandwidth feature stream.